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explain and limit, but as no one has spoken from their ranks a word from a layman may be of service.

The handling of objects which have been preserved in a 4 % solution kills the outer cuticle and appears to have a paralyzing effect on the sub-cuticular nerve terminations. Repeated use demoralizes the skin very badly. The vapor or minute drops arising in dissection from the objects manipulated is liable to cause serious affections of the eye. We have just heard from a recent collaborator of the museum who has narrowly escaped the loss of one eye, and is probably condemned for life to the use of glasses as a result of dissections of slugs preserved in formalin. Irritation of the mucous membrane of the air passages has probably been observed by every one who has used this preservative.

WM. H. DALL.

U. S. NATIONAL MUSEUM,

WASHINGTON, D. C., October 12, 1897.

#### SCIENTIFIC LITERATURE.

*Hallucinations and Illusions. A Study of the Fallacies of Perception.* By EDMUND PARISH. London, Walter Scott; New York, Charles Scribner's Sons, 1897. Pp. 390. Contemporary Science Series, Vol. XXXI.

The present volume is a rewriting, by the author, of his German monograph, published about three years ago; and this in turn grew out of his examination, for the Munich Psychological Association, of the cases collected in Germany for the 'International census of Waking Hallucinations in the Sane'—a project initiated and vigorously promoted by the English Society for Psychical Research. While there is an extensive literature on some one or another of the many ramifications of the general subject of illusions—particularly contributions of cases illustrative of certain special kinds or causes of illusion—there is a conspicuous lack of more comprehensive and systematic treatises covering the general field, both descriptively and with the purpose of presenting these various forms of fallacious perception from some unifying theory or principle.

It can hardly be said that the author has succeeded in filling this gap, although the road

which he set out to survey has been covered with accuracy and originality. Comparison is at once suggested with the older volume of Sully on 'Illusions,' which, though far less scientifically thorough and necessarily lacking in the explanations and conceptions that have grown out of recent research, is none the less more comprehensive in scope and more philosophical as well as attractive in treatment. The general reader will still find more enlightenment as to the nature of illusions in the work of Sully than in that of Parish, although he can find no abler treatment of certain phases of this study than the latter work offers. To begin with, Dr. Parish's definition of his topic rules out the consideration of that interesting group of normal deceptions of the senses—commonly known as optical illusions and the like—which are so significant for the study of sense-interpretation and perception. Indeed, instead of conceiving an illusion as any form of psychological process which happens to be erroneous he aims to establish a type of perception, at times normal and at times abnormal, as the basis of all hallucinations and illusions. This underlying principle is found to be that of dissociation, "a state in which, indeed, generally speaking, the consciousness is normal, but where the association-paths of a more or less complicated system of elements are wholly or partially blocked." Hallucinations and illusions "are just as much sensory perceptions as the so-called 'objective' perceptions." The dream state is an extreme state of dissociation, and as such hallucinations and illusions become the stuff that dreams are made of; in insanity and nervous fatigue; in moments of emotional excitement as well as of rapt attention; under the influence of drugs and particularly in hypnotic states, the conditions are favorable for that distortion and inhibition of the normal association-paths which Dr. Parish holds to be the starting point of fallacious perception.

This conception has much in its favor; it makes it natural to find a considerable number of hallucinations among the sane and in the waking state; it certainly binds together the various forms of semi-abnormal and morbid conditions under which illusions most commonly occur; it is equally adaptable to the explana-

tion of the experimental phases of the topic, such as hypnotism, automatic writing, crystal vision; and it further gains strength by the inherent weakness of former theories, both 'centrifugal' and 'centripetal,' which attempted to present the illusion as a reversal of the physiological process of true sensation or of some of the cortical and subcortical functions. In spite of these advantages, it cannot be claimed that this or any other theory at present serves any other purposes than that of a temporary framework for a building that is yet to be planned. The physiologist and the pathologist, as well as the alienist and psychologist, must all expend very much more planning and labor upon the foundations before a really suitable superstructure can be possible. More literally, the present status of the subject seems hardly likely to yield a true explanation of the illusory process, a satisfactory account of what really goes on in nerve and brain-cell as well as in the field of mental processes when we see with the mind's eye.

This criticism is offered in no disparagement of Dr. Parish's essay. His attempt to bring order out of chaos is most commendable, and for what is, perhaps, the most striking example of the fruitful nature of his conception the reader may be referred to is the ingenious analysis of 'audible thinking' as the analogy of 'automatic writing' which is given in Chapter VIII.

A considerable portion of the volume is devoted to the presentation of the statistics of hallucinations of the sane and their critical discussion, one phase of this discussion being devoted to those hallucinations which are supposed to be 'veridical' or to serve as proofs of 'telepathic' agencies. This portion of the work is most commendable; the sincerity and painstaking devotion of the compilers of the census and other evidence for telepathy are fully appreciated and acknowledged. But the verdict is 'not proven,' with a strong indication in favor of the negative. The extreme complexity and variety of the sources of error, the inherent defects of the logical cogency of the evidence, and the likelihood of the applicability of other and more normal forms of explanation, are all admirably set forth and to-

gether form a line of argument which the numerically strong but logically weak accumulations of cases are not likely to overcome. This careful sifting of obscure sources of error, this technical and thorough analysis of the real nature of these elusive hallucinatory conditions, makes rather difficult reading, but it is the only profitable mode of dealing with the subject.

This lack of popular attractiveness in Dr. Parish's work is probably a desirable feature, at least in some respects. The interest in this and kindred topics has been entirely too much centered upon the explanation of individual experiences and the proving of this or that hypothesis. The prevalent popular attitude is that of the man who has had an experience and wants it 'explained,' even to the most trifling detail, and who, in default of such explanation, feels warranted in disparaging the science that so dismally fails when practically tested, and in accepting any hypothesis, however unnatural or unscientific, which seems to cover his case. It is well to impress this individual with the inherent difficulty of such study, with the technical acquisitions needed to qualify one to form any opinion on the matter, and with the true statistical and impersonal method of dealing with 'cases.' The principle that in the progress of science the interest in the abnormal precedes and only slowly gives way to an interest in the normal has recently been well emphasized and illustrated;\* it is as true in psychology as in other sciences. The superficial interest in much that is 'psychic' doubtless belongs to this earlier stage of culture and will probably give way to a better comprehension and appreciation of man's normal psychology. A lesser form of utility of the present volume is in disparaging an undesirable and uncritical interest in the abnormal.

JOSEPH JASTROW.

*Manual of Bacteriology.* By ROBERT MUIR, M.A., M.D., F.R.C.P., Ed., Lecturer on Pathological Bacteriology, and Senior Assistant to the Professor of Pathology, University of Edinburgh; Pathologist, Edinburgh Royal Infirmary; and JAMES RITCHIE, M.A., M.D., B.Sc., Lecturer in Pathology, University of

\* By W J McGee, SCIENCE, Vol. VI., p. 413.